



TENNESSEE DEPARTMENT OF

**EDUCATION**  
FIRST TO THE TOP

## Introduction to Collision Repair

<b>Primary Career Cluster:</b>	Transportation, Distribution & Logistics
<b>Consultant:</b>	Rachel Allen, (615) 532-2835, <a href="mailto:Rachel.Allen@tn.gov">Rachel.Allen@tn.gov</a>
<b>Course Code(s):</b>	6172
<b>Prerequisite(s):</b>	None
<b>Credit:</b>	1
<b>Grade Level:</b>	9
<b>Graduation Requirements:</b>	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Transportation, Distribution & Logistics courses.
<b>Programs of Study and Sequence:</b>	This is the first course in the <i>Automotive Collision Repair</i> program of study.
<b>Aligned Student Organization(s):</b>	SkillsUSA: <a href="http://www.tnskillsusa.org">http://www.tnskillsusa.org</a> Brandon Hudson, (615) 532-2804, <a href="mailto:Brandon.Hudson@tn.gov">Brandon.Hudson@tn.gov</a>
<b>Coordinating Work-Based Learning:</b>	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit <a href="http://tn.gov/education/cte/work_based_learning.shtml">http://tn.gov/education/cte/work_based_learning.shtml</a> .
<b>Available Student Industry Certifications:</b>	Automotive Service Excellence (ASE) Student or Professional Certification or I-CAR Refinish Technician ProLevel 1 or I-CAR Non-Structural Technician ProLevel 1
<b>Dual Credit or Dual Enrollment Opportunities:</b>	Students who obtain the ASE student certification may be able to articulate hours at Tennessee Colleges of Applied Technology.
<b>Teacher Endorsement(s):</b>	507, 771
<b>Required Teacher Certifications/Training:</b>	ASE B-3 or ASE B-4 or I-CAR Industry Certification
<b>Teacher Resources:</b>	<a href="http://www.tn.gov/education/cte/TransportationDistributionLogistics.shtml">http://www.tn.gov/education/cte/TransportationDistributionLogistics.shtml</a>

### Course Description

*Introduction to Collision Repair* is a foundational course in the Collision Repair program of study for students interested in learning more about automotive collision repair technician careers. Upon completion of this course, proficient students will be able to identify and explain the basic steps in the collision repair process, emphasizing the tools, equipment, and materials used. They will be able to describe the major parts of an automobile body and safely perform basic procedures in preparing

automotive panels for repair, applying body filling, and preparing surfaces for painting. Standards in this course include career investigation of the opportunities in automotive collision repair as well as an overview of the history of automobile design and construction. Standards in this course are aligned with Tennessee State Standards for English Language Arts & Literacy in Technical Subjects, Tennessee State Standards in Mathematics, and to the National Automotive Technicians Education Foundation (NATEF) standards, a national framework of industry-benchmarked standards.\* Students completing the Collision Repair program of study will be eligible to take the examination for Automotive Student Excellence (ASE) Student Certification in Collision Repair. Some tasks are assigned a "High Priority (HP)" designation. NATEF accredited programs must include at least 95% of the HP-I (Individual) tasks and 90% of the HP-G (Group) tasks in the curriculum.

## Program of Study Application

This is the foundational course in the *Automotive Collision Repair* program of study. For more information on the benefits and requirements of implementing these programs in full, please visit the Transportation, Distribution & Logistics website at <http://www.state.tn.us/education/cte/TransportationDistributionLogistics.shtml>.

## Course Standards

### Safety

For every task in *Collision Repair: Non-Structural*, the following safety requirement must be strictly enforced:

- 1) Comply with personal and environmental safety practices associated with clothing and the use of gloves; respiratory protection; eye protection; hearing protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations. Identify vehicle manufacturer's SRS (supplemental restraint system) types, locations, and recommended procedures before inspecting or replacing components. (TN Reading 3, 4)
  - a. Use and inspect personal protective equipment every time equipment is used.
  - b. Inspect, maintain, and employ safe operating procedures with tools and equipment, such as hand and power tools, ladders, scaffolding, and lifting equipment.
  - c. Assume responsibilities under HazCom (Hazard Communication) regulations.
  - d. Adhere to responsibilities, regulations, and Occupational Safety & Health Administration (OSHA) policies regarding reporting of accidents and observed hazards, and regarding emergency response procedures.
  - e. Maintain a portfolio record of written safety examinations and equipment examination for which the student has passed an operational checkout by the instructor.
  - f. Utilize MSDSs (material safety data sheets), and identify the health hazards associated with hazardous material.

### History of Automobiles

- 2) Synthesize research from textbooks, automotive magazines, and professional journals to create an annotated timeline or visual graphic illustrating significant time periods in the development of automobile design and construction, emphasizing the changing collision repair methods.

Develop a persuasive essay making a claim about the impact of a particular event or time period on current practices in the collision repair industry. (TN Reading 3, 7; TN Writing 1, 4, 7, 9)

### **Career Investigation**

- 3) Cite supporting evidence from multiple career information sources, such as O\*NET OnLine, to summarize the essential knowledge and skills required for collision repair technicians. Identify and analyze areas of specialization within the Collision Repair field such as metal technician, structural technician, refinish technician, and detailing technician. Produce a chart or other graphic detailing the aptitudes and training needed for a collision repair technician career. Devise a tentative career plan to reach employment goals. (TN Reading 1, 2, 7, 9; TN Writing 2, 4, 8, 9)
- 4) Compile and analyze real-time and projected labor market data from public sources such as the U.S. Bureau of Labor Statistics to investigate local and regional occupational opportunities and trends in the field of collision repair. Synthesize collected data to develop a written summary outlining education requirements, job availability, salaries, and benefits. (TN Reading 2, 7; TN Writing 4, 8, 9; TN Math S-ID)

### **Overview of Collision Repair Operations**

- 5) Research collision repair processes described in textbooks, repair center websites, or by interviewing technicians. Citing research, create and publish a written, oral, or visual presentation describing the major steps involved in the collision repair process including estimating, disassembling, performing repairs, refinishing, reassembling, detailing, and final inspection. Discriminate between the different types of repair work such as metal work, structural repairs, mechanical and electrical repairs, and refinishing. (TN Reading 1, 2, 3, 4; TN Writing 4, 6, 8, 9)

### **Vehicle Construction**

- 6) Utilize appropriate terminology to classify and describe vehicles based on vehicle size, roof design, drive system type, and engine location. Compare and contrast the major types of body frames (i.e. body-over-frame, unibody, and space frame). Create a visual display with supporting text to describe the major structural parts, sections, and assemblies of each type of body frame. (TN Reading 2, 3, 4, 7; TN Writing 4)
- 7) Identify and describe the major parts and components which make up an automobile body, analyzing the purpose of and interrelationships among each component and explaining the sequence in which each is put together in assembly. (TN Reading 2, 3, 4, 5)

### **Tools & Equipment**

- 8) Accurately identify a wide range of hand tools, power tools, and equipment used in the collision repair industry. Hand tools should include wrenches, sockets, screwdrivers, pliers, files, holding tools, punches, chisels, and hammers in metric and/or Society of Automotive Engineers (SAE) sizes where appropriate/. Power tools should include air tools, grinders, polishers, blasters, and

spray guns. Equipment should include spray booths, paint drying equipment, straightening systems, and lifts. (TN Reading 2, 3, 4)

- 9) Assess a variety of situations requiring the use of hand tools, power tools, and equipment. Select the proper tool, critique the readiness of the tool, use the tool to accomplish the desired task, clean the tool, and then return the tool to its proper storage according to correct size and nomenclature. For example, demonstrate the ability to safely use an air ratchet to remove hood hinge bolts. (TN Reading 3; TN Math N-Q)
- 10) Use physical measurement devices typically employed in collision repair to complete accurate field measurements. Determine the appropriate units and record accurate measurements of lengths, angles, pressure, volume, and other measurements. Tools should include, but are not limited to: fractional rule, metric rule, measuring tape, dial caliper, micrometer, dial indicators, pressure gauges, and mixing cups. (TN Reading 3; TN Math N-Q)
- 11) Apply mathematics concepts to solve collision repair problems, distinguishing which principles apply to a given automotive problem. Concepts should include, but are not limited to:
  - a. Operating with whole numbers, fractions, and decimals. (TN Math N-Q)
  - b. Performing conversions between fractions, decimals, and percent. For example, convert a decimal to a fraction to prepare a unit for measurement on a fractional scale to the precision of 1/16 of an inch. (TN Math N-Q)
  - c. Working with units such as feet, inches, meters, centimeters, and millimeters, and determining appropriate units for a given repair task. For example, convert fractions of an inch into millimeters to determine the appropriate size metric wrench to use to loosen a bolt. (TN Math N-Q)
  - d. Performing proportionate reasoning to estimate quantities. (TN Math N-Q)

### **Collision Repair Materials**

- 12) Distinguish between the various types of fasteners commonly used in vehicle construction, such as bolts, nuts, washers, screws, nonthreaded fasteners, and adhesives, by creating a visual display outlining the properties and uses of each type. Define torque and describe the procedures for applying the appropriate torque to tighten bolts. Demonstrate the ability to accurately remove, reinstall, and select the appropriate fastener in a variety of situations. For example, consult torque specifications to determine the torque value for a given size and grade of bolt and perform proper tightening sequences to secure bolts. (TN Reading 2, 4, 5, 7)
- 13) Compare and contrast the properties and uses of basic materials employed in collision repair processes, such as body fillers, putty, mashing materials, abrasives, sandpapers, primers, paint types, drying and curing materials, and sealers. Describe and demonstrate common procedures used by collision repair centers to clean and properly dispose of materials and supplies. (TN Reading 3, 4, 9)

### **Preparation of Non-Structural Body Components**

- 14) Gather information from a variety of print and digital sources, such as textbooks, original equipment manufacturer (OEM) manuals, and online instructional materials, as well as firsthand experiences observing a qualified technician on the basic steps necessary to prepare non-

structural body components for repair. Write a summary of the steps involved in the process, as if explaining the process to a new automotive collision repair student, and be able to perform each step. (TN Reading 2, 3, 4, 5, 6, 8; TN Writing 2, 4, 7, 9)

- a. Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan. HP-I
- b. Inspect, remove, label, store, and reinstall exterior trim and moldings. HP-I
- c. Protect panels, glass, interior parts, and other vehicles adjacent to the repair area. HP-I
- d. Soap and water wash entire vehicle; complete pre-repair inspection checklist. HP-I

### **Metal Finishing and Body Filling of Non-Structural Body Components**

15) Read and interpret textbooks, OEM manuals, and other instructional materials to determine the basic steps necessary to properly repair surface irregularities on a damaged body panel. Apply the appropriate tools, equipment, and procedures to safely perform panel repairs. (TN Reading 2, 3, 4)

- a. Remove paint from the damaged area of the body panel. HP-I
- b. Locate and repair surface irregularities on a damaged body panel. HP-I
- c. Heat shrink stretched panel areas to proper contour. HP-I
- d. Identify different types of body fillers. HP-G
- e. Prepare and apply body filler. HP-I
- f. Rough sand body filler to contour; finish sand. HP-I

### **Surface Preparation for Painting and Refinishing**

16) Read and interpret textbooks, OEM manuals, and other instructional materials to determine the basic steps necessary to prepare a surface for painting. Apply the appropriate tools, equipment, and procedures to safely prepare a surface for painting. (TN Reading 2, 3, 4)

- a. Mix primer, primer-surfacer, or primer-sealer. HP-I
- b. Apply primer onto surface of repaired area. HP-I
- c. Block sand area to which primer-surfacer has been applied. HP-I
- d. Dry sand area to which finishing filler has been applied. HP-I
- e. Clean area to be refinished using a final cleaning solution. HP-I

## **Standards Alignment Notes**

\*References to other standards include:

- TN Reading: [Tennessee State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects](#); Reading Standards for Literacy in Science and Technical Subjects 6-12; Grades 9-10 Students (page 62).
  - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standard 10 at the conclusion of the course.
- TN Writing: [Tennessee State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects](#); Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6-12; Grades 9-10 Students (pages 64-66).

- Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standards 3, 5, and 10 at the conclusion of the course.
- TN Math: [Tennessee State Standards for Mathematics](#); Math Standards for High School: Number and Quantity, Statistics.
  - Note: The standards in this course are not meant to teach mathematical concepts. However, the concepts referenced above may provide teachers with opportunities to collaborate with mathematics educators to design project based activities or collaborate on lesson planning. Students who are engaging in activities listed above should be able to demonstrate quantitative and statistical reasoning as applied to specific technical concepts. In addition, students will have the opportunity to practice the habits of mind as described in the eight Standards for Mathematical Practice.
- National Automotive Technicians Education Foundation (NATEF) standards for [Non-Structural Analysis and Damage Repair](#) (pages 62-65) and [Painting and Refinishing](#) (pages 73-77).
- P21: Partnership for 21st Century Skills [Framework for 21st Century Learning](#)
  - Note: While not all standards are specifically aligned, teachers will find the framework helpful for setting expectations for student behavior in their classroom and practicing specific career readiness skills.